CLAIMS APPENDIX

15. A system for withdrawing permeate from a liquid substrate while leaving particulate matter therein, comprising,

(a) a non-pressurized reservoir other than a shell of a module for containing the substrate;

(b) an assembly having a plurality of hollow fiber filtering membranes immersed in the substrate each membrane having a length greater than 0.5 m, the membranes together providing a surface area of at least greater than 1 m^2 and disposed generally vertically between upper and lower generally cylindrical solid bodies comprised of a potting material with (i) the solid bodies having the membranes sealingly secured therein so as to prevent the substrate from contaminating the permeate, at least a portion of the membranes spaced apart from adjacent membranes by the potting material to a center to center distance in the range from 1.2 to 5 times the outside diameter of the membranes, (ii) lumens of said membranes being in fluid communication with at least a permeate collection means connected to one of the solid bodies and immersible in the substrate or to a pair of permeate collection means connected one to each of the solid bodies and both immersible in the substrate, and, (iii) said membranes having a length between opposed surfaces of the solid bodies, in the range from 0.1% to 5% greater than the distance between opposed surfaces of the solid bodies;

(c) a pump in fluid communication with said lumens of said membranes through at least one permeate collection means, said pump operable to apply a suction to the lumens of the membranes to draw a component of the substrate as permeate through said membranes while leaving particulate matter in said substrate; and,

(d) aeration means having through-passages with openings, distributed both radially and circumferentially between the membranes for discharging air directly into the substrate near the lower solid body to provide a column of bubbles rising from near lower ends of the membranes.

16. The system of claim 15 wherein the length is in the range from 0.1% to 1% greater than the distance between the opposed surfaces of the solid bodies.

17. The system of claim 16 wherein the aeration means includes a rigid air supply tube for carrying air to the through-passages and for spacing and positioning the lower and upper solid bodies relative to one another.

18. The system of claim 17 wherein the air supply tube has additional through-passages along its length.

23. The system of claim 15 wherein the aeration means comprises an air blower and a passageway between the air blower and the openings is sealed so as to prevent the substrate from entering the passageway other than through the openings.